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(54) Flexible light protection structure, resistant to all kind of impacts, capable of absorbing shocks

(57) This invention is about a flexible light protection structure, that can be used as a knee pad, ankle support, thigh support, etc.. This invention is also the base structure for the construction of helmets, chest protectors or even protective gloves, that are usually required when practicing sports in general. The structure of the present invention is very light and flexible and has a great capacity for absorbing shocks without translating them. This invention relates to a mesh conformed by interwoven helical straps. The mesh is folded onto itself defining at least one internal cavity where ribs are housed for rigidity purposes. The mesh can be made of any material such as plastic, artificial fibers of metal. The inclusion of rigid reinforcing rods intercalated with the helical straps is also provided.

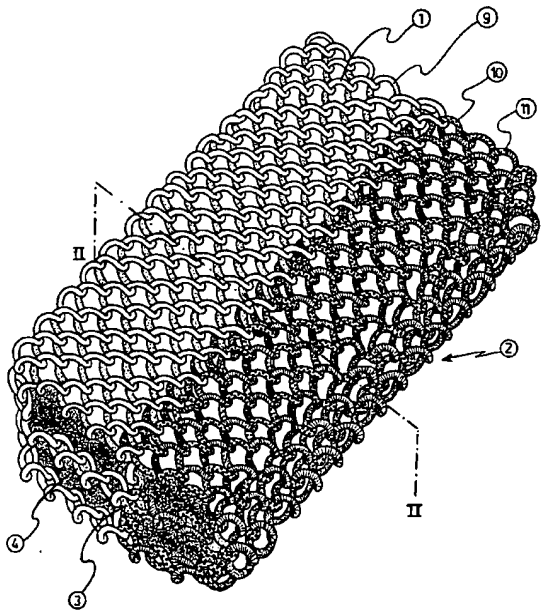

FIG. 1

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Description

[0001] The main object of the present patent of invention is a flexible light anti-traumatic protection structure, extremely resistant to all kind of impacts, capable of lessening dynamic pressure, being very effective for using on the human body due to the fact that its main virtue is absorbing the strength of the impact without transmitting it to the user's body, thereby lessening the dynamic pressure produced by said impacts.

[0002] More particularly, the present patent of invention discloses a very special anti-traumatic protection structure that can be used to shape a knee pad, an ankle support, a thigh support, a shin pad, a chest protector, a shoulder pad, etc. This structure can also be used for shaping a sports helmet; protective gloves such as those required for a baseball game; vests for different uses; or different shields against sharp or edgy elements.

PREVIOUS ART

[0003] The previously mentioned protection elements are greatly required nowadays for different sportive activities, their function being the user's protection both against muscular stress in various body parts as well as all kind of dynamic impacts produced by external shocks or blows.

[0004] These elements can be placed - on a detachable basis - when practicing sports, though they may be required as external tutors for particular bone and muscular injuries recovery processes.

[0005] Some materials with which said elements are formed, such as webs with combinations of elastomeric threads are well known in the art. Due to their stretchability, these materials are capable of adapting themselves anatomically to the user's body. Other materials such as those formed from the material called "neoprene", whose advantage is to keep the protected area warm, as well as applying elastic pressure, are also well known.

[0006] In other cases, these well known materials are used to conform elements of very different shapes. Graded adjusting means as well as other metallic or rigid plastic elements are incorporated, acting as reinforcing or stiffing strings, resistant to counteract against localized stresses in the most exposed areas. Conventional shin pads, for example, are very well known. Most sportsmen practicing soccer or rugby use shin pads consisting of slabs conformed by webs housing rigid flat straps, all of which are affixed to the leg of the user by means of an elastic band.

[0007] Even though these protection elements basically fulfill the requirements for which they where created, it can be said that they do not absorb the shocks, on the contrary, they transmit and distribute them over a larger area.

[0008] While effectively complying with the normal aims and functions for each case, the structure referred to in the present invention, counts with the additional advantage that it is capable of absorbing shocks without translating the stress received.

[0009] The obvious difference between these protection means and those cited as antecedent, lays in that in the present invention, the structure itself acts as a shock absorbing means, being also the mechanical protection that may be required for each case. Besides being light and flexible, it is very resistant to wearing and highly resistant to breaking.

[0010] All the previously mentioned advantages are a direct consequence of the particular shaping and composition of the invented protection structure, arising from a flexible light structure shaped by the interweaving of helical straps. This structure is used to shape low thickness pieces having at least some internal cavities, that can be left hollow or be filled by a rigid or flexible reinforcing element.

[0011] The fact that this structure is formed by helical iron straps interwoven together forming a mesh causes the structure to be extremely flexible and able to adapt itself to any shape, regardless the composition of the materials for the straps.

[0012] Once the previously mentioned mesh is formed - having the size and shape required for each case, the structure is shaped by means of folding allowing the formation of flattened cuffs, having at least one internal cavity. The final form of the structure will be in accordance with the kind of protection element that is desired to have built.

[0013] In a shin pad, for example, the mesh formed by the spiraling straps will have a thickness that after being folded could define a body of similar dimensions to those of a normal shin pads, or it could even include two or more lengthened cavities where flat ribs of rigid materials resistant to shocks are housed.

[0014] In cases where it is necessary to provide a greater resistance capacity to the product to be formed, this invention also provides the addition of lengthened rods intercalated between the interwoven helical spires conforming the mesh. These rods can be formed from different materials and be placed according to different orientations. The possibility of combining rods placed according to different orientations or formed from different materials is also provided.

[0015] The invention provides the use of compound materials for the construction of the mesh as well as for the previously mentioned ribs and rods, such as "Grillon" or "Nylon", etc., or also fibers such as "Kevlar" "Tuarown", "DINEMA", etc., or also metallic materials such as steel, aluminum, titanium, etc., or even elastomeric ones. This invention also provides the possibility that the product thus formed can receive an injection of polyurethane or other fluids, filling the gaps between the interwoven straps.

[0016] The advantages herein described will be more fully understood, and further advantages will become

apparent to users and those skilled in the art. In order to facilitate the understanding of the constructive, constitutive and functional characteristics of the protection structure of the present invention, a preferred embodiment is hereinafter described, which is schematically illustrated and according to no scale in the enclosed figure. It should be apparent that the following is only an example and should not be considered as restrictive or exclusive to the scope of the present invention. Consequently, the following example is intended for explanatory and illustrative purposes of the idea in which the present invention is based on.

[0017] Figure 1 is a perspective view showing, as an example, a protection structure capable of acting as a shin pad, seen in its general appearance.

[0018] Figure 2 is a cross section view, according to line II-II shown in Figure 1.

[0019] Figure 3 is a top plan view showing a protection structure reinforced with intercalated rods or crossbeams.

[0020] Figure 4 is a perspective view showing a protection structure such as that shown in Figure 1, in which polyurethane has been injected.

[0021] All reference numbers in the figures correspond to the same or equivalent parts or constitutive elements of the assembly, according to the example chosen for the illustration of the protection structure of the present invention.

[0022] As can be clearly seen in Figure 1, the flexible light protection structure of the present invention is formed by interweaving helical straps -1-, bound together through their longitudinal shafts parallel to themselves. The assembly of straps thus interwoven forms a mesh -2- extremely porous and flexible, a feature caused by the mobility allowed by this kind of binding among the interwoven straps. These straps can be metallic (steel, titanium, aluminum, etc.) -9-, combined with other fiber straps -10- and other compound materials -11-.

[0023] Figure 1 also shows that the mesh -2- is folded on itself, including a vertical central partition -3- extending from side to side, and another transversal partition -4-, also extending from side to side.

[0024] Said partitions allow the housing of flat ribs -5-, -6-, -7-, and -8- whose main aim is to keep the structure duly shaped and also to provide an improved rigidity and shock resistance capacity. According to the needs of each case, these ribs can be made of plastic or even from a metallic, fiber, or compound material.

[0025] The cross section of Figure 2 clarifies the distribution of said component elements, according to the present example.

[0026] Observing said Figure 2, it can be clearly seen that the internal cavities, instead of housing the shown flat ribs 5/8, can be filled with a polyurethane or polymers injection that while also provides mechanical resistance to the assembly, do not affect said flexibility features.

[0027] The top plan view shown in Figure 3 represents another constructive option that can be achieved incorporating straight long rods or crossbeams -12-.

[0028] Said rods lay stretched in the inner space defined by the helical spires of the straps that conform the mesh, multiple constructive options being generated according to the material with which it is built, since these rods could be made of metal, plastic fibers of varying densities, or other combinations or compound materials. Their thickness or cross section diameter can also vary, increasing or decreasing the flexibility of the mesh. The rods can also have an oblique orientation, as shown in Figure 3, or also parallel to any of the sides of the mesh. It is even possible to build structures combining rods placed according to different orientations, or formed from different materials, fibers or compound materials, as well as combining different sizes of rods. This Figure shows a combination of metallic rods -13- with other rods made of fiber -14- and a third kind of rods made from compound materials -15-.

[0029] Figure 4 shows another constructive option that should be considered as covered by the scope of the present invention. Taking advantage of the particular conformation of the mesh - the interwoven helical straps - the generated gaps allow the injection of plastic materials, being thus able to build shaped rigid bodies that do not lose the shock absorption capacity that a helical straps mesh provides.

[0030] Having thus described the invention in rather full detail, it will be readily apparent to a person of ordinary skill that various changes and modifications can be made without departing from the spirit of the invention. All of such changes and modifications are contemplated as being within the scope of the present invention as defined by the subjoined claims.

Claims

1. Flexible light anti-traumatic protection structure, resistant to all kind of impacts, capable of lessening dynamic pressure on the human body, capable of being used as a knee pad, ankle support, thigh support or also being the base structure for forming a chest protector, sports helmets, special gloves or any other tutor protection means for physical activities in general, whereby this structure is conformed by a basic mesh of helical straps interwoven together, which is folded onto itself defining at least one internal cavity that houses shock resistant means.

2. The protection structure of claim 1, wherein there are two internal cavities, separated by an internal longitudinal partition conformed by a helical straps mesh, bound to the base mesh.

3. The protection structure of claim 1, wherein the internal cavities are four, defined by two internal partitions extending longitudinally and being formed by

helical straps meshes, respectively, bound to the base mesh.

4. The protection structure of claim 1, wherein the lined gaps defined by the helical straps of the base mesh are the housing for longitudinal rods.

5. The protection structure of claim 4, wherein the longitudinal rods are placed parallel to one of the sides of the structure.

6. The protection structure of claim 4, wherein the longitudinal rods are placed oblique to one of the sides of the structure.

7. The protection structure of claim 1, wherein the helical straps are built from compound materials such as "Grillon".

8. The protection structure of claim 1, wherein the helical straps are built from compound materials such as Nylon.

9. The protection structure of claim 1, wherein the helical straps are built from artificial fibers.

10. The protection structure of claim 1, wherein the helical straps are metallic.

11. The protection structure of claim 1, wherein the helical straps are elastomeric.

12. The protection structure of claim 1, wherein the shock resistant rigid means are flat ribs.

13. The protection structure of claim 1, wherein the gaps generated by the interwoven helical straps are filled with polymers.

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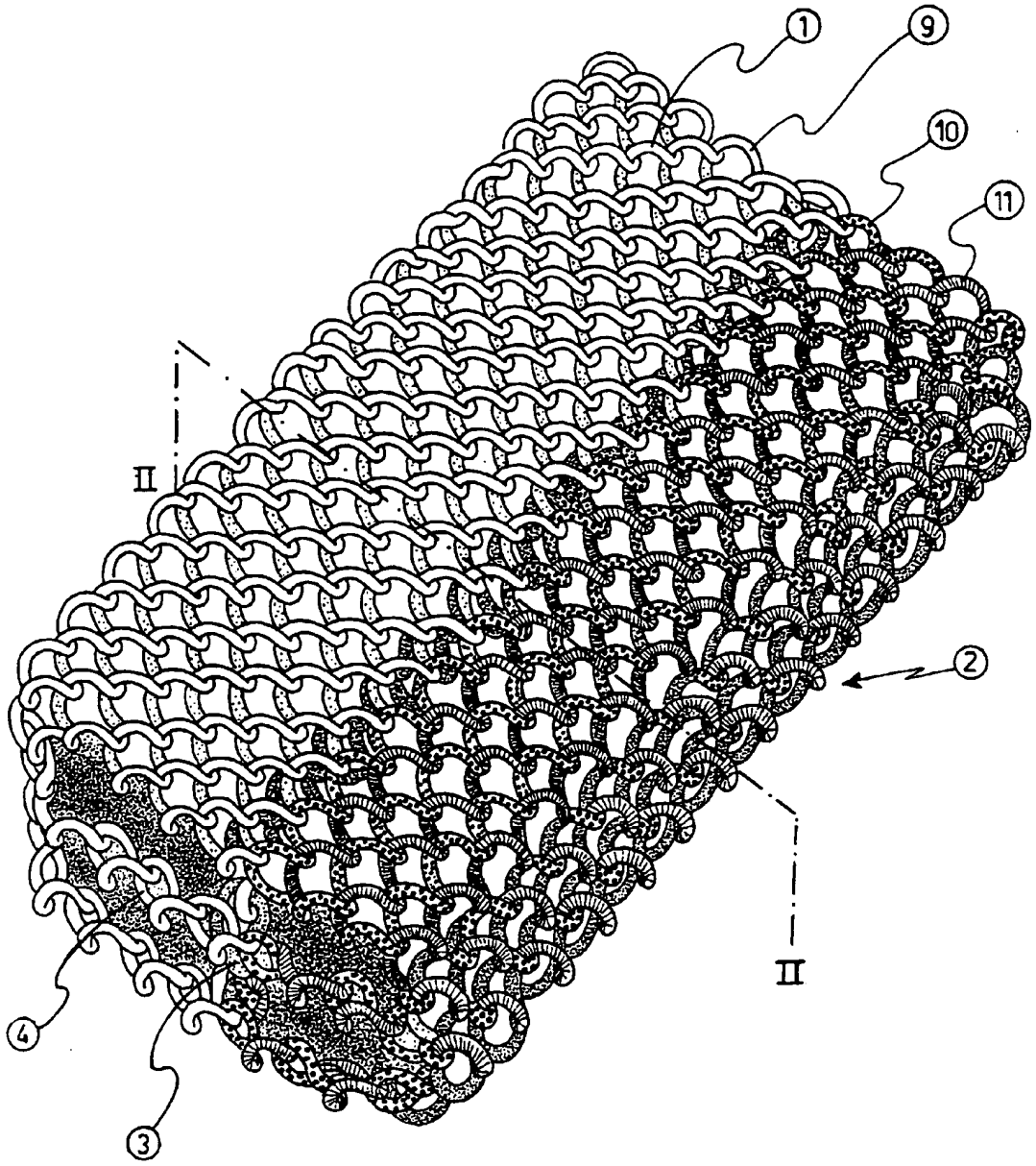

FIG. 1

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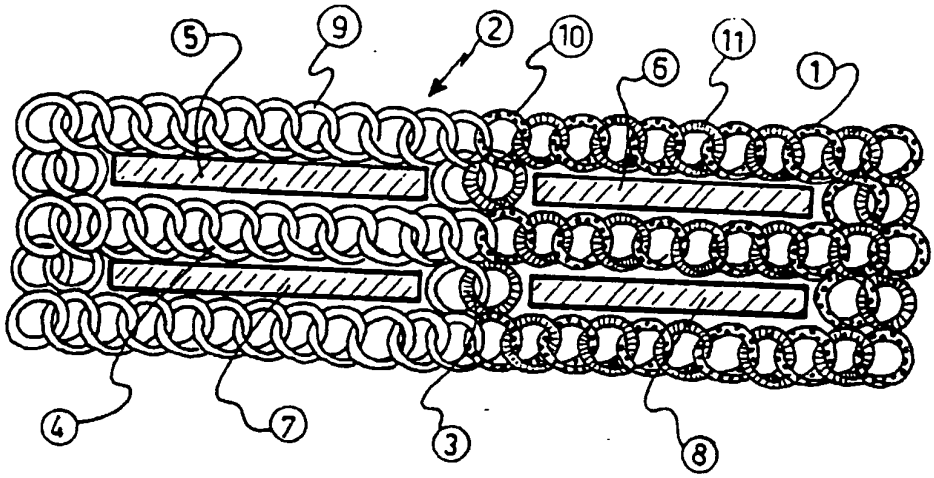

CROSS-SECTION II-II

FIG. 2

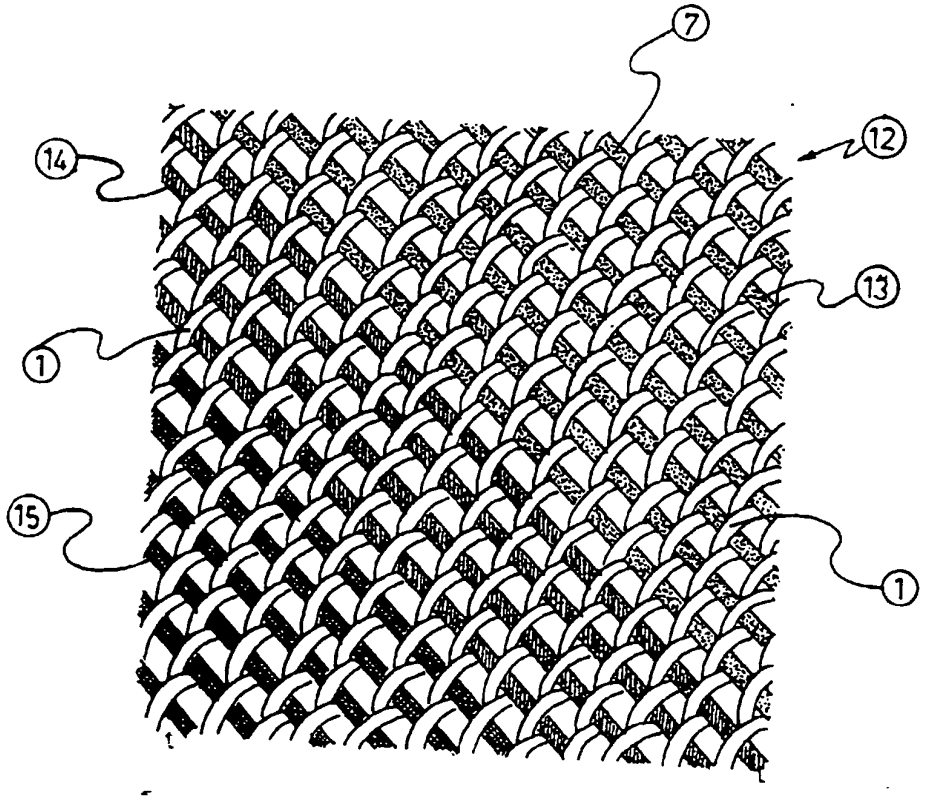

FIG. 3

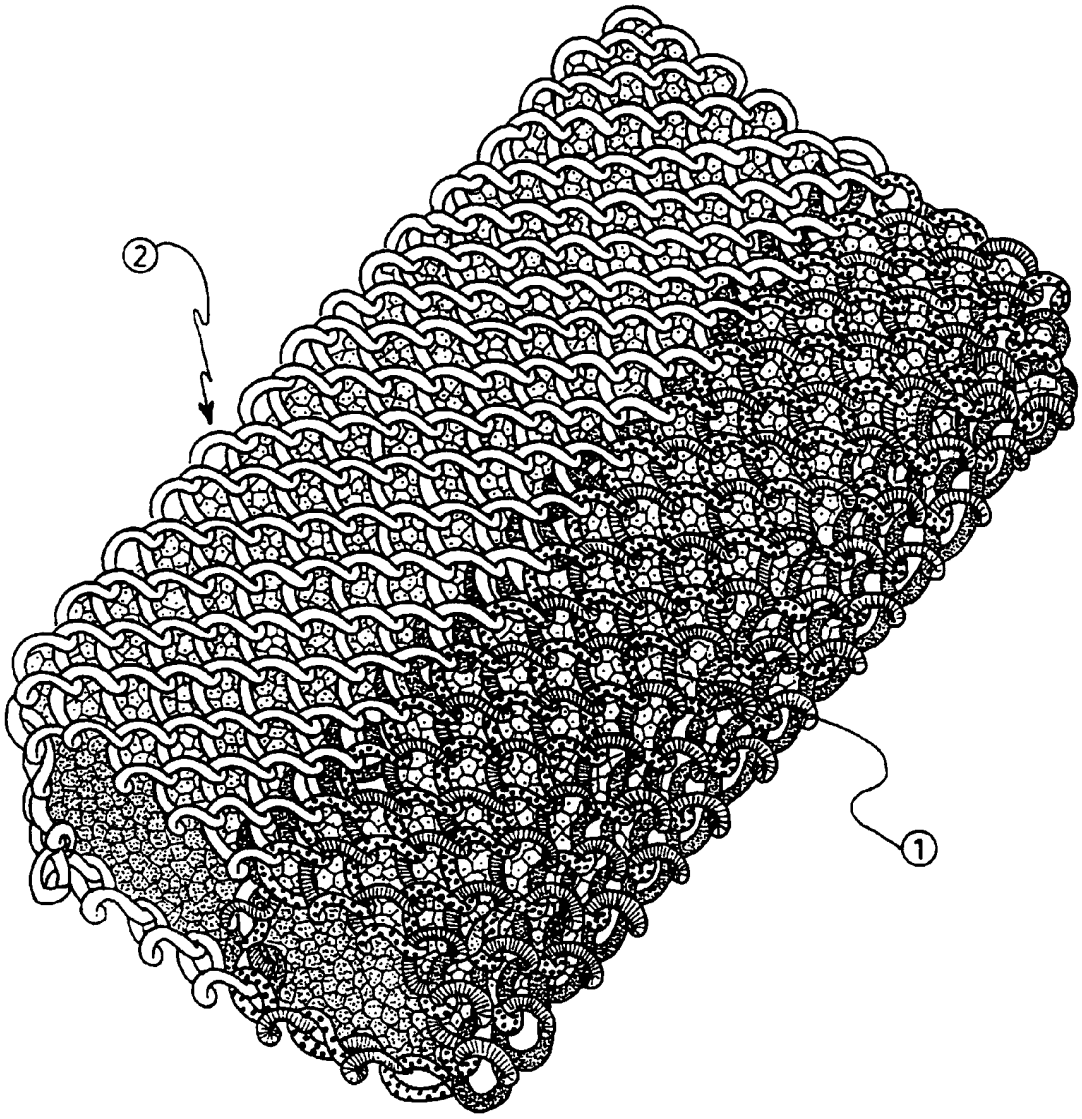

FIG. 4